

Patterning the Powers of 10 Print Activity

Use the Table and Viewer screens in the “Explore It” mode to check your solutions:

1. Fill in the blanks in the following tables:

a.

Power	Numeric Value	Expanded
10^1		
10^0		
10^{-1}		
10^{-2}		

b.

Power	Numeric Value	Expanded	Lowest Value Fraction	Fractional Exponent
10^{-2}		$\frac{1}{10 \times 10}$		
10^0				$\frac{10^0}{1}$
		$10 \times 10 \times 10 \times 10 \times 10$	$\frac{100000}{1}$	
	100		$\frac{100}{1}$	

c.

Power	Expanded	Lowest Value Fraction	Numeric Value
10^4			
10^{-5}			
10^{-3}			
10^5			

2. a. Are the expressions 10^0 and 10^1 equivalent? Circle Yes or No.

b. Determine the numeric values of 10^0 and 10^1 :

$$10^0 = \underline{\hspace{2cm}} \quad 10^1 = \underline{\hspace{2cm}}$$

3. a. Are the expressions 10^{-8} and 10^8 equivalent? Circle Yes or No.

b. Determine the numeric values of 10^{-8} and 10^8 :

$$10^{-8} = \underline{\hspace{2cm}} \quad 10^8 = \underline{\hspace{2cm}}$$

4. In the Viewer screen, you can scroll through magnified and reduced images relating positive and negative exponents. Determine the exponents related to the following images:

a. Earth and the orbit of the moon

$$1,000,000,000 \text{ m} = 10^{\square} \text{ m}$$

b. Nucleus of the cell

$$1 \text{ micrometer} = 0.000\,001 \text{ m} = 10^{\square} \text{ m}$$

c. DNA nucleotide building blocks

$$1 \text{ nanometer} = 0.000\,000\,001 \text{ m} = 10^{\square} \text{ m}$$

5. Two students were comparing the size of an individual DNA strand (10^{-8} m) and the size of the nucleus of the cell (10^{-6} m).

Jack: “ 10^{-8} is a larger value than 10^{-6} , so the size of an individual DNA strand must be larger than the size of the nucleus of the cell.”

Jenn: “I think 10^{-6} is a larger value than 10^{-8} because $^{-6}$ is larger number than $^{-8}$. So the size of the nucleus of the cell must be larger than the size of an individual DNA strand.”

- a. Fill in the blanks in the following table:

Power	Expanded	Numeric Value
10^{-8}		
10^{-6}		

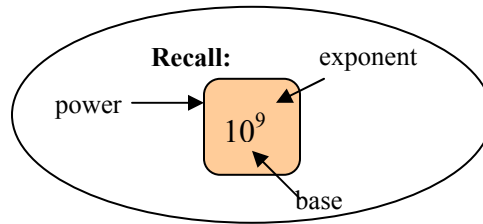
- b. Using the table completed in Part a, answer the following question:

Which is larger: an individual DNA strand (10^{-8} m) or the nucleus of the cell (10^{-6} m)? Circle your answer below.

Individual DNA strand or Nucleus of the cell

- c. Using the table completed in Part a, which student is correct?

6. Complete the following table:



	Exponent	Base	Power	Numeric Value	
Difference in the Exponents:	0	10	10^0	1	Difference in the Numeric Values:
1					9
	1	10	10^1	10	
			10^2		
			10^3		
			10^4		

- What do you notice about the difference in exponents?
- What do you notice about the difference in numeric values?
- Continue the pattern above by filling in the blanks below:

Power	Numeric Value	
10^5		Difference in the Numeric Values: <input type="text"/> <input type="text"/>
10^6		
10^7		

- d. Which difference in the numeric values will be larger: the difference between 10^6 and 10^7 or the difference between 10^7 and 10^8 ? Explain why.